Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation	9/23/2014 3:20:36 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
rent or Future K Observations	1
mber of Bootstrap Operations	2000

Aroclors

General Statistics

Total Number of Observations	43	Number of Missing Observations	0
Number of Distinct Observations	36		
Number of Detects	18	Number of Non-Detects	25
Number of Distinct Detects	17	Number of Distinct Non-Detects	19
Minimum Detect	4.95	Minimum Non-Detect	1.3
Maximum Detect	16.18	Maximum Non-Detect	5.2
Variance Detected	10.21	Percent Non-Detects	58.14%
Mean Detected	8.466	SD Detected	3.195
Mean of Detected Logged Data	2.078	SD of Detected Logged Data	0.34

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.097	d2max (for USL)	2.897

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.857	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.209	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	4.303	SD	4.065
95% UTL95% Coverage	12.83	95% KM UPL (t)	11.22
90% KM Percentile (z)	9.513	95% KM Percentile (z)	10.99
99% KM Percentile (z)	13.76	95% KM USL	16.08

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	4.182	SD	4.215
95% UTL95% Coverage	13.02	95% UPL (t)	11.35
90% Percentile (z)	9.583	95% Percentile (z)	11.11
99% Percentile (z)	13.99	95% USL	16.39
DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons			

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.687	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.74	etected data appear Gamma Distributed at 5% Significance Lev	
K-S Test Statistic	0.189	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.204	etected data appear Gamma Distributed at 5% Significance Lev	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only

k hat (MLE)	8.733	k star (bias corrected MLE)	7.314
Theta hat (MLE)	0.969	Theta star (bias corrected MLE)	1.157
nu hat (MLE)	314.4	nu star (bias corrected)	263.3
MLE Mean (bias corrected)	8.466		
MLE Sd (bias corrected)	3.13	95% Percentile of Chisquare (2k)	24.51

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

	A	B	C	D	E	F	G	H	I	J	K	L
63	GROS may not be used when kstar of detected data is small such as < 0.1											
64	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
65	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
66	Minimum					0.01			Mean			4.055
67	Maximum					16.18			Median			1.484
68	SD					4.33			CV			1.068
69	k hat (MLE)					0.62		k star (bias corrected MLE)				0.592
70	Theta hat (MLE)					6.54		Theta star (bias corrected MLE)				6.847
71	nu hat (MLE)					53.32			nu star (bias corrected)			50.94
72	MLE Mean (bias corrected)					4.055			MLE Sd (bias corrected)			5.269
73	95% Percentile of Chisquare (2k)					4.282			90% Percentile			10.58
74	95% Percentile					14.66			99% Percentile			24.55
75	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
76	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
77					WH	HW					WH	HW
78	Approx. Gamma UTL with 95% Coverage				19.42	22.88		95% Approx. Gamma UPL			14.43	16.14
79	95% Gamma USL				32.79	42.71						
80												
81	The following statistics are computed using gamma distribution and KM estimates											
82	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
83	k hat (KM)					1.121			nu hat (KM)			96.37
84					WH	HW					WH	HW
85	Approx. Gamma UTL with 95% Coverage				15.22	15.89		95% Approx. Gamma UPL			12	12.24
86	95% Gamma USL				23.4	25.72						
87												
88	Lognormal GOF Test on Detected Observations Only											
89	Shapiro Wilk Test Statistic					0.927		Shapiro Wilk GOF Test				
90	5% Shapiro Wilk Critical Value					0.897	Detected Data appear Lognormal at 5% Significance Level					
91	Lilliefors Test Statistic					0.166		Lilliefors GOF Test				
92	5% Lilliefors Critical Value					0.209	Detected Data appear Lognormal at 5% Significance Level					
93	Detected Data appear Lognormal at 5% Significance Level											
94												
95	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
96	Mean in Original Scale					5.292			Mean in Log Scale			1.504
97	SD in Original Scale					3.416			SD in Log Scale			0.551
98	95% UTL95% Coverage					14.28		95% BCA UTL95% Coverage				15.91
99	95% Bootstrap (%) UTL95% Coverage					15.93			95% UPL (t)			11.48
100	90% Percentile (z)					9.111			95% Percentile (z)			11.13
101	99% Percentile (z)					16.2			95% USL			22.18
102												
103	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
104	KM Mean of Logged Data					1.024	95% KM UTL (Lognormal)95% Coverage					19.19
105	KM SD of Logged Data					0.921		95% KM UPL (Lognormal)				13.33
106	95% KM Percentile Lognormal (z)					12.65		95% KM USL (Lognormal)				40.07
107												
108	Background DL/2 Statistics Assuming Lognormal Distribution											
109	Mean in Original Scale					4.182			Mean in Log Scale			0.889
110	SD in Original Scale					4.215			SD in Log Scale			1.076
111	95% UTL95% Coverage					23.21			95% UPL (t)			15.16
112	90% Percentile (z)					9.653			95% Percentile (z)			14.27
113	99% Percentile (z)					29.7			95% USL			54.88
114	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
115												
116	Nonparametric Distribution Free Background Statistics											
117	Data appear to follow a Discernible Distribution at 5% Significance Level											
118												
119	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
120	Order of Statistic, r					43		95% UTL with95% Coverage				16.18
121	Approximate f					2.263	Confidence Coefficient (CC) achieved by UTL					0.89
122	95% UPL					13.66			95% USL			16.18
123	95% KM Chebyshev UPL					22.23						
124												

	A	B	C	D	E	F	G	H	I	J	K	L
125	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
126	data set free of outliers and consists of observations collected from clean unimpacted locations.											
127	The use of USL tends to provide a balance between false positives and false negatives provided the data											
128	represents a background data set and when many onsite observations need to be compared with the BTV.											
129												